

# DIVERSITY AND FLORISTIC COMPOSITION OF THE VASCULAR PLANTS IN THE FOREST FRAGMENT IN SOUTHEASTERN RIO DE JANEIRO, BRAZIL

Regina H.P. Andreata

*Universidade Santa Úrsula/ICBA  
22231-040, R. Fernando Ferrari 75,  
RJ, BRASIL  
regina.andreata@gmail.com*

Haroldo C. de Lima

*Instituto de Pesquisas  
Jardim Botânico do Rio de Janeiro  
22460-030; R. Pacheco Leão 915, RJ, BRASIL  
hlima@jbrj.gov.br*

Angela S. Fonseca Vaz

*IBGE/Instituto de Pesquisas  
Jardim Botânico do Rio de Janeiro  
22460-030, R. Pacheco Leão 915, RJ, BRASIL  
avaz@jbrj.gov.br*

José Fernando A. Baumgratz

*Instituto de Pesquisas  
Jardim Botânico do Rio de Janeiro  
22460-030, R. Pacheco Leão 915, RJ, BRASIL  
jbaumgra@jbrj.gov.br*

Sheila R. Profice

*Instituto de Pesquisas Jardim Botânico do Rio de Janeiro  
22460-030, R. Pacheco Leão 915, RJ, BRASIL  
sprofice@jbrj.gov.br*

## ABSTRACT

The diversity and floristic composition of the vascular plants of the Morro Alto Mourão, within the Serra da Tiririca State Park, Rio de Janeiro State, Brazil ( $22^{\circ} 58' 04''$  S  $\times$   $43^{\circ} 01' 17''$  W), were analyzed. The study area includes an important fragment of montane forest within the Atlantic Coastal Forest biome. A total of 369 taxa were collected, including 7 Pteridophytes, 295 Dicotyledons, and 67 Monocotyledons, belonging to 84 different families. These plants are distributed among three life-forms: arboreal, shrub-arboreal, and herbaceous. A map of the area, a graphic representation of the local water balance, plant profiles, soil analyses and descriptions of the climates of the eastern and western facing slopes of the Serra da Tiririca Mountains are presented. Rare or endangered and endemic species are indicated. A list of the taxa is also provided that cites flowering and fruiting, habit descriptions in addition to the name of the collectors.

## RESUMO

A diversidade e a composição florística das plantas vasculares foram analisadas no Morro Alto Mourão ( $22^{\circ} 58' 04''$  S e  $43^{\circ} 01' 17''$  W) situado no Parque Estadual da Serra da Tiririca, localizado no estado do Rio de Janeiro, Brasil. A área de estudo compreende um importante fragmento florestal da cadeia montanhosa litorânea que integra a Mata Atlântica. Foram registrados 369 táxons, sendo 7 Pteridófitas, 295 Dicotiledôneas e 67 Monocotiledôneas, pertencentes a 84 famílias. As plantas distribuem-se em três formações: arbórea, arbustivo-arbórea e herbácea. Apresenta-se um mapa, gráficos de balanço hídrico e perfis esquemáticos da área. São dadas informações referentes à análise do solo. Caracterizam-se os tipos climáticos das encostas voltadas para oeste e a leste da Serra da Tiririca. Assinala-se a ocorrência de espécies raras e/ou ameaçadas e endêmicas. É fornecida uma listagem dos táxons, dados do hábito, floração, frutificação e dos coletores do material examinado.

## INTRODUCTION

Coastal forests are an important component of the Atlantic Coastal Forest biome. These forests are distributed along most of the eastern coast of Brazil. However, they have been subject to intense degradation within this range, due mainly to their proximity to large urban centers.

Detailed information concerning the coastal vegetation of Rio de Janeiro State is relatively limited. This study examines the coastal vegetation of the Morro Alto Mourão region, including components of the humid coastal forest and the near-shore (*restinga*) vegetation. The Morro Alto Mourão is one of the highest points in the Serra da Tiririca Range (369 m). It is located in southeastern Rio de Janeiro State between the municipalities of Niterói and Maricá. It still retains significant fragments of one of the most highly threatened biomes in the world—the Atlantic Coastal Forest.

The Serra da Tiririca Range is oriented almost perpendicular to the Atlantic coastline, which results in contrasting climatic conditions on its two flanks. The western slopes are generally exposed to the humid ocean winds. Intense rainfall is also common, principally due to cold fronts arriving from the southern polar region. On the other hand the more sheltered eastern slopes lie in the rain shadow and receive less and lighter rainfall.

The first historical references to the area date from the end of the 16th century when the Portuguese crown awarded a large land title (*sesmaria*) to Duarte Martins Mourão. This title granted formal control of the coastal lands between the Lagoa de Piratinha and Pedra de Inoã, in the current municipality of Maricá. Human use and occupation of this region is very intense. It was cultivated with large numbers of small sugar cane, coffee, and banana plantations, as well as citrus orchards up until the start of the 20th century (Grael et al. 1995).

Even though this region was highly disturbed (and is located near large urban centers as Niterói and Maricá cities) the vegetation on the Morro Alto Mourão is experiencing a gradual but natural regeneration. Currently, plants with ornamental, medicinal, timber value and species of great scientific importance (rare or endemic to the State of Rio de Janeiro and/or the Atlantic Coastal Forest) that are often little known to botanists have been discovered.

Preliminary data from this study have been presented at scientific meetings and helped transform the Serra da Tiririca Environmental Protection Area into the more highly protected Serra da Tiririca State Park (Rio de Janeiro State Law No.1901, of November 29, 1991).

This study presents the results of a floristic inventory undertaken in the area around the Morro Alto Mourão. This inventory examined the diversity and composition of the vascular plants within an area of coastal forest. It is intended to be used to support conservation and degraded areas restoration efforts along Rio de Janeiro State coast.

## MATERIALS AND METHODS

### Study Area

The Morro Alto Mourão is located in the Serra da Tiririca Range, which covers approximately 2700 hectares near Pontas de Itaipuaçu and Itacoatiara ( $22^{\circ} 58' 04''$  S  $\times$   $43^{\circ} 01' 17''$  W) (Fig. 1). The Morro Alto Mourão is part of a pre-Cambrian age crystalline massif (Niterói Massif) located along the eastern shore of the Guanabara Bay. The peak has one of the highest elevations (369 m) in the Tiririca mountains, together with Morro do Elefante (or Falso Pão-de-Açúcar) (412 m) and Morro do Telégrafo (250 m) (Pontes 1987).

The ground is generally covered by leaf litter although there are also exposed rock areas. The sandy-clay soil has a medium texture, is highly acidic (pH = 4.7–4.8) and has mid-range quantities of calcium (3.5 me/100 mg), phosphorous (12 ppm) and magnesium (1.6 me/100 mg). The aluminum concentration is high (1.0 me/100 mg), and the potassium concentration very high (> 135 ppm). The high acidity and large quantities of aluminum and potassium found in the soils are probably the result of leaching and frequent burning.

The western slopes of the Tiririca Range have a sub-humid climate (C2), with an A' megathermic temperature regime. The average annual temperature is  $23.2^{\circ}$  C, annual rainfall 1305 mm, annual evapo-transpiration potential 1271 mm, real annual evapo-transpiration 1207 mm, annual water-deficit 64 mm and annual excess 98 mm (Fig. 2). On the other hand, the eastern slopes have a sub-humid humid climate (C2) and a B4 meso-thermic temperature regime.

The average annual temperature there is  $23.2^{\circ}$  C, annual rainfall 1207 mm, annual evapo-transpiration potential 1223 mm, real annual evapo-transpiration 1163 mm, annual water-deficit 60 mm and annual excess 62 mm (Fig. 3). The greater rainfall and humidity encountered on the western slopes are due to the direct influence of humid on-shore ocean winds.

### Methods

Plant collections were made during systematic monthly excursions to the area between 1980–85 and 1989–90.




FIG. 1. Localization of the Morro Alto Mourão, Rio de Janeiro State, Brazil.

Collections were undertaken on the Morro Alto Mourão, as well as on the Morro do Elefante and Pedra de Itacoatiara, which have a similar vegetation cover. During the period from 1986 to 1988, collections were less frequent. However, these were generally accompanied by certain plant group specialists or undertaken especially to prepare schematic diagrams representing the phytphysiognomy of the vegetation.

All collected material was identified and registered at the herbaria of the Instituto de Pesquisas Jardim Botânico do Rio de Janeiro (RB), the Universidade Santa Úrsula (RUSU) and GUA, HB, FFP (Orchidaceae).

The plant lists are presented in an appendix, with the family names in alphabetical order. The Angiosperm families are named according to Cronquist (1988). Those of the Pteridophytes are named according to Kramer and Green (1990). The flowering and fruiting periods are derived from the specimens collected in the area.

A map of the area, diagrams indicating the water balance and schematic vegetation profiles are provided. The different phytphysiognomies were classified as either arboreal, shrub-arboreal, or herbaceous in order to characterize the vegetation cover.

Climatic data for the Serra da Tiririca was obtained from the Niterói Weather Station (representing the climatic conditions prevalent on the western slopes, directly exposed to humid winds and intense rainfall) and from the Maricá Station (representing the climatic conditions prevalent on the eastern slopes that are shielded from the humid winds and intense rainfall characteristic of the western slopes). The techniques of Thornthwaite and Mather (1955) were employed to prepare local water balance diagrams, quantify the available soil humidity (evapo-transpiration) and determine the degree (either deficiency or surplus) of the water balance during the year based on the monthly rainfall data obtained from these stations.




FIG. 2. Diagram of the water balance of Niterói (1958–67). Water Balance according to Thornthwaite & Mather (1955). Latitude: 22° 54'S- Longitude: 43° 07'W. Annual Precipitation: 1305 mm = P. Annual Evapo-transpiration potential: 1271 mm = EP. True Annual Evapo-transpiration: 1207 mm = ER. Annual Water deficit: 64 mm. Annual Water Excess: 98 mm.

Two soil samples were taken (0–20cm deep) and analyzed at The Soil Fertility Division of the National Service of Research and Conservation of Soils at EMBRAPA, in the city of Rio de Janeiro.

#### RESULTS AND DISCUSSION

##### Taxonomic diversity

A total of 369 taxa were sampled within the study area. Seven of those were Pteridophytes (3 families), 295 were Dicotyledoneae (63 families) and 67 Monocotyledoneae (18 families) (Appendix 1).

Leguminosae (40 taxa), Euphorbiaceae (23), Rubiaceae (20), Myrtaceae (15), Solanaceae (16), Bromeliaceae (12), Orchidaceae (12), Araceae (11) and Sapindaceae (11) represented the greatest taxa richness. These totaled 43% of the Angiosperms encountered.

*Solanum* (10 taxa), *Rhipsalis* (6), *Machaerium*, *Philodendron*, *Anthurium* and *Trichilia* (5 taxa each) were the most representative genera.

Classifying these plants by habit, the largest diversity was observed among the herbs and sub-shrubs, which were regionally represented by 115 taxa. The trees comprised 96 taxa, followed by the shrubs, climbers and epiphytes, with 92, 52, and 18 taxa, respectively (Appendix 1).

Comparisons of the plant species richness of Morro do Alto Mourão with other forest areas within the Serra do Mar Range in Rio de Janeiro State are shown in Table 1. A tendency towards reduced species richness can be seen within coastal forest areas near the city of Rio de Janeiro (Morro do Alto Mourão, Horto/JBRJ, and Morro das Andorinhas) in relation to humid forests in the Serra do Mar Range (Macaé de Cima, Cairuçu, and Tinguá). However, the high degree of local endemism of the coastal forests is very notable, with 20 species restricted to only Rio de Janeiro State (Appendix 1). This same pattern of endemism was reported by Lima (2000) and Sá (2006) who noted that most of the endemic species occurred in seasonal forests.




FIG. 3. Diagram of the water balance of Maricá (1987–99). Water Balance according to Thornthwaite & Mather (1955). Latitude: 22° 55'S- Longitude: 42° 49'W. Average Annual Temperature: 23.2°C. Annual Precipitation: 1207 mm = P. Annual Evapo-transpiration potential: 1223 mm = EP. True Annual Evapo-transpiration: 1163 mm = ER. Annual Water deficit: 60 mm. Annual Water Excess: 62 mm. Water Withdrawal: 81 mm; Water Replacement: 81 mm. Climatic type: Effective Humidity Index: sub-humid humid C2. Thermal efficiency: B'4 mesothermic.

The floristic diversity of the Morro Alto Mourão flora was high in comparison with these other areas of the Atlantic Coastal Forest (Horto/JBRJ and Morro das Andorinhas), even when allowing for the different methodologies and sample sizes used in the different surveys. The significant floristic diversity of this coastal mountainous region within the Serra do Mar Range is probably due to numerous factors, the most important likely being significant local climatic diversity (due to the unique geographic position of the Serra da Tiririca Range).

#### Physiognomic-floristic analysis

The vegetation on the Morro Alto Mourão is typical of the Serra do Mar Range. It can be classified as low-montane rain forest (Rizzini 1979). In regions where the eastern border of the Serra do Mar Range approach the coastline, the forest becomes smaller in stature (principally due to limiting edaphic conditions and slope) and acquires many elements of the near-shore (*restinga*) vegetation. There are also areas of shrubs/small trees and herbaceous vegetation near the rock outcrops. The different physiognomies observed on the Morro do Alto Mourão are illustrated in Figure 4.

In addition to the secondary forest formations in the study area (resulting from human intervention

TABLE 1. Numbers of families, genera, and specific and infra-specific taxa among the vascular flora in areas of Atlantic Coastal Forest within the state of Rio de Janeiro, Brazil.

	Alto Mourão	JBRJ/Horto <sup>1</sup>	Andorinhas <sup>2</sup>	Reserva Ecológica Macaé de Cima <sup>3</sup>	APA- Cairuçu <sup>4</sup>	Reserva Biológica do Tinguá <sup>5</sup>
Families	84	74	60	122	133	124
Genera	244	168	103	413	483	421
Total taxa	369	277	105	1103	1087	1037

<sup>1</sup>Marquete et al. (1992); <sup>2</sup>Araujo and Vilaça (1981); <sup>3</sup>Lima and Guedes-Bruni (1997); <sup>4</sup>Marques (1997); <sup>5</sup>PMA/JBRJ (2002).

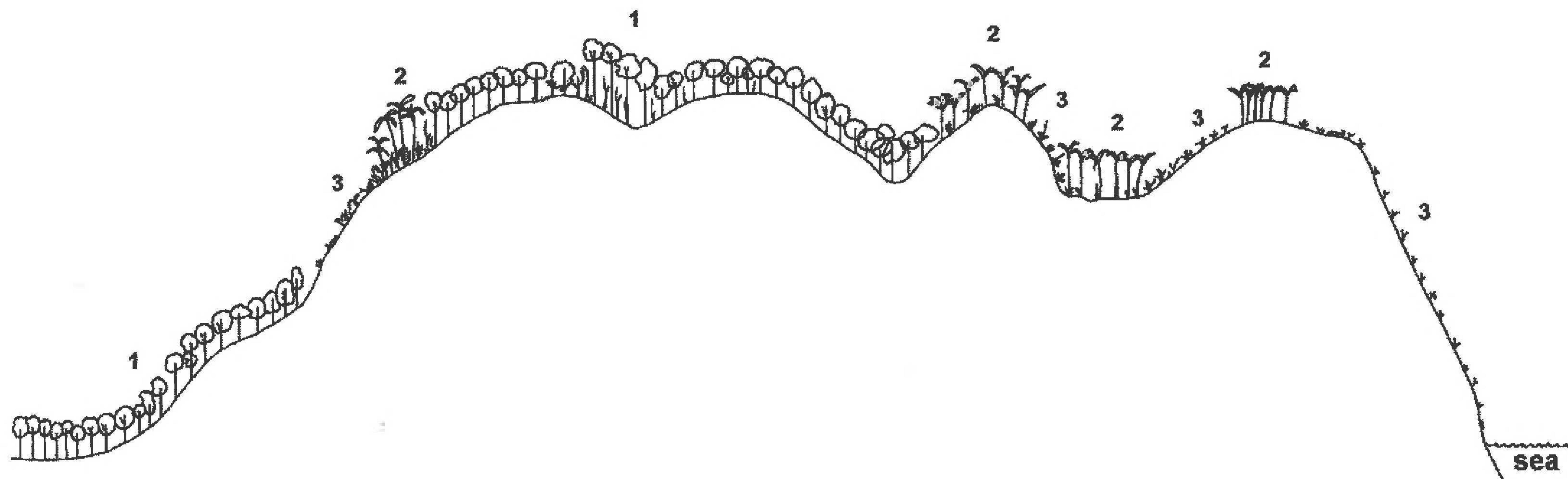


FIG. 4. Schematic profile of the phyto-physiognomies of the Morro Alto Mourão, Rio de Janeiro State, Brazil. 1. Arboreal formation; 2. Shrub-arboreal formation; 3. Herbaceous formation.

during the last three centuries) there are also small primary forest fragments. According to Pontes (1987), the Atlantic Coastal Forest once occupied the entire region around the Serra da Tiririca, but was subsequently subjected to extreme fragmentation through logging and clearing. Only isolated sections of the original forest remained in relatively inaccessible areas, such as Morro do Telégrafo and Morro Alto Mourão.

Edaphic and climatic factors must have played important roles in the establishment of plant communities or large populations in the area, resulting in the mosaic of successional stages found there today.

Despite the often imprecise limits of distinction between them, three principal physiognomic formations are recognized in this study: arboreal, shrub-arboreal, and herbaceous.

### Arboreal formation

Arboreal formations dominate the study area and they presumably occupied an even greater proportion of the slopes in this region in earlier times. The topography is generally gentle and allows the accumulation of organic and inorganic material (the latter formed by the gradual breakdown of the rock substrate) that is necessary for soil formation and forest establishment. These arboreal formations now occupy the slopes and depressions, resulting in the formation of deep and fertile soils.

There are two forest layers—the upper and lower canopies, determined principally by the height of the component individuals (Fig. 5).

The upper canopy is closed and is composed of individuals that are generally between 12 and 25 m tall (remnants of the original forest). Some emergents are to be found, with average heights between 25 and 30 m, such as *Cariniana legalis*, *Anadenanthera colubrina*, *Pterogyne nitens*, *Schinus terebenthifolius*, *Gallesia integrifolia* and *Coussapoa curranii*.

The lower canopy is composed of individuals that are between 5 and 12 m tall. This layer is more open, and the tree crowns being more widely spaced. Some representative species are: *Piptadenia gonoacantha*,

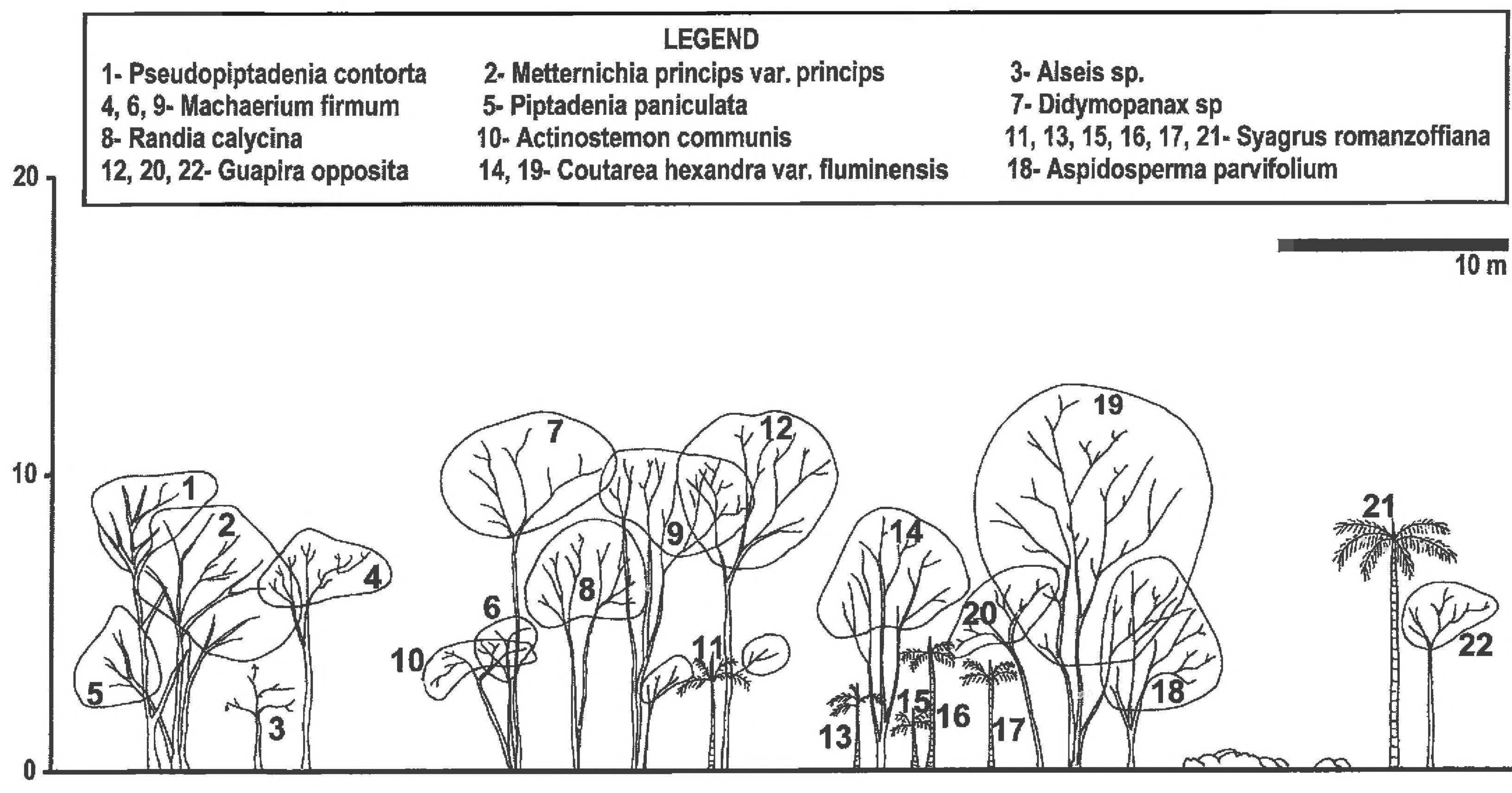


FIG. 5. Schematic profile of the arboreal formation of the Morro Alto Mourão, Rio de Janeiro State, Brazil.

*Erythroxylum pulchrum*, *E. frangulifolium*, *Metternichia principis* var. *principis*, *Pseudobombax grandiflorum*, *Guapira opposita*, and *Casearia sylvestris* var. *sylvestris*.

#### The shrub-arboreal formation

A shrub-arboreal vegetation predominates on the ocean-facing mountain slopes. This vegetation is very dense, with a xeromorphic aspect. However, it has a small number of emergent species (Fig. 6). Species common to the sandy near-shore (*restinga*) vegetation, such as *Clusia fluminensis* and *Brasiliopuntia brasiliensis* are also present.

This formation has reasonably large populations of plants that stand out physiognomically in the vegetation, such as *Marlierea racemosa*, *Eugenia uniflora*, *Myrcia insularis*, *M. richardiana*, and *Psidium cattleyanum* (all of the Myrtaceae family) that vary in height from 5–7 m. *Pachystroma longifolium* can reach up to 10 m. There are also smaller populations of *Esenbeckia febrifuga* growing together with the palm tree *Syagrus romanzoffiana* (that can reach 10–15 m).

*Clavija spinosa*, *Jacaranda jasminoides*, *Inga congesta*, *Brunfelsia uniflora*, *Norantea brasiliensis*, *Cupania racemosa*, *Tibouchina corymbosa*, and *Faramea stipulacea* are well represented among the shrubs.

This same shrub-arboreal vegetation harbors numerous herbaceous and sub-shrub species (e.g., *Justicia beyrichii*, *Sinningia aggregata*, *Eupatorium organense*, *Julocroton triqueter*, *Capparidastrum brasiliatum*, *Cyperus diffusus*, *Calathea truncata*, *Selaginella sulcata*, *Alstroemeria caryophyllea*, and *Neomarica* sp.). These cannot be considered a distinct formation in themselves as they are very thinly distributed within the area. On the other hand, there are dense populations of *Schaueria calycotricha* in shaded areas at the forest edge, near rock outcrops with many weedy plants such as *Petiveria alliacea*, *Sida rhombifolia*, *Oxalis barrelieri*, *Solanum alternopinnatum*, and *Stachytarpheta polyura*, as well as epiphytes and vines.

Epiphytes and hemi-epiphytes are relatively uncommon in the area. They include *Anthurium pentaphyllum*, *A. scandens* subsp. *scandens*, *Monstera adansonii* var. *klotzschiana*, *Philodendron bipennifolium*, *P. cordatum*, *Aechmea nudicaulis* var. *nudicaulis*, *Neoregelia ampullacea*, *Billbergia pyramidalis* var. *pyramidalis*, *Rhipsalis teres* f. *capilliformis*, *R. mesembryanthemoides*, *R. neves-armondii*, and *R. pachyptera*, among other taxa of Gesneriaceae, Orchidaceae, Piperaceae, and Pteridophytes.

Some epiphytes are encountered in the area with other life forms, such as *Anthurium scandens* subsp.

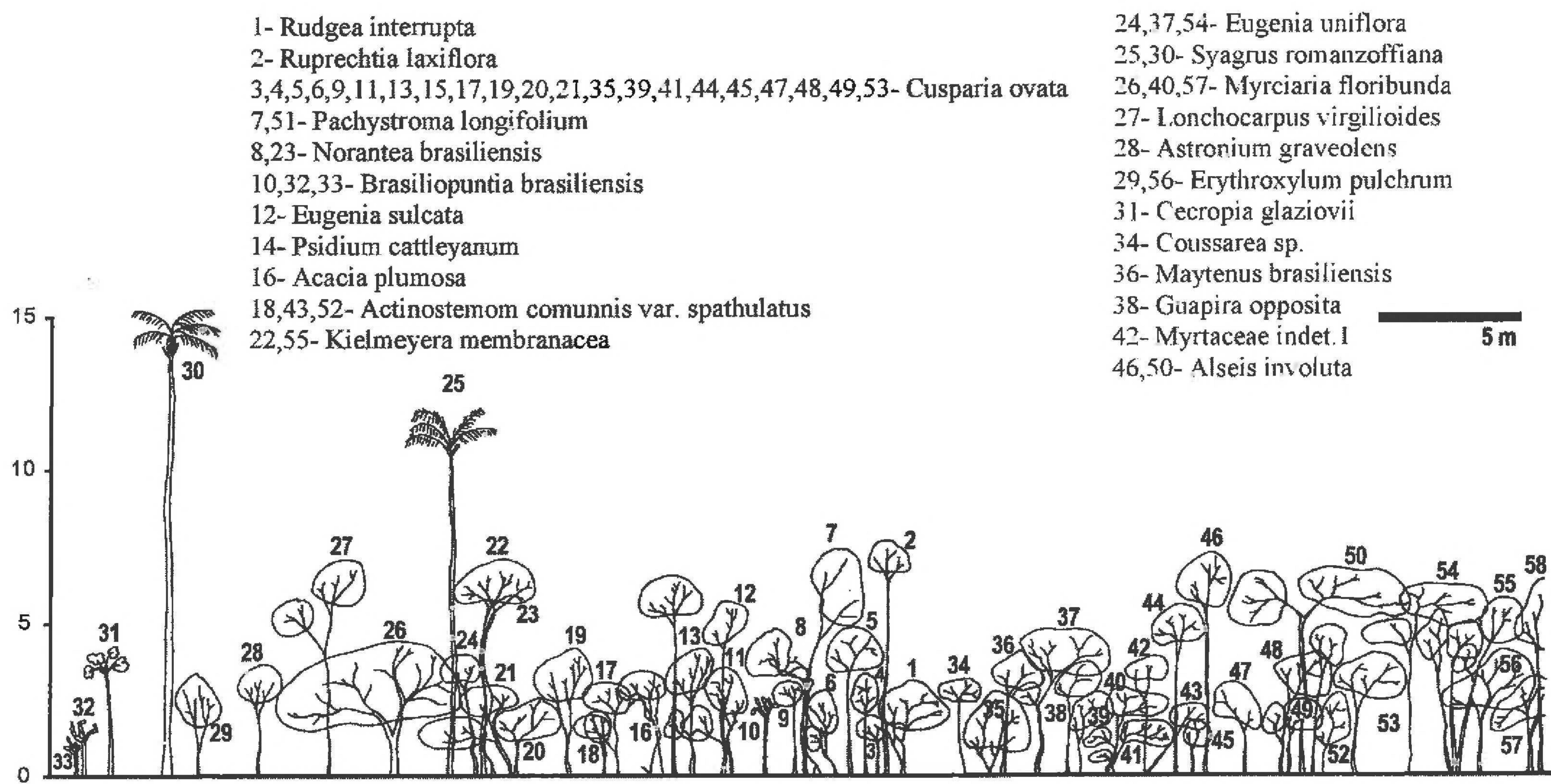


FIG. 6. Schematic profile of the shrub-arboreal formation of the Morro Alto Mourão, Rio de Janeiro State, Brazil.

*scandens*, as rupicolous, and terrestrial individuals of *Philodendron cordatum*. Also *Oncidium* and *Pleurothallis* species are encountered both as epiphytic and rupicolous.

Both woody and non-woody vines are found on the Morro Alto Mourão, especially species belonging to the genera *Adenocalymma*, *Anemopaegma*, *Bauhinia*, *Chaetocalyx*, *Centrosema*, *Serjania*, *Paullinia*, *Urvillea*, *Heteropterys*, *Tetrapterys*, *Chondrodendron*, *Hyperbaena*, *Passiflora*, *Ipomoea*, *Jacquemontia*, *Reissekia*, *Dioscorea*, *Smilax*, and *Herreria*.

A single species of the hemi-parasite *Struthanthus marginatus* was encountered.

### The herbaceous formation

This vegetation type is typically found on rock outcrops where plants grow directly on the rock surface (rupicolous) or within thin sandy strips of soil near the rock outcrops (saxicolous). The plants at these sites are exposed to extreme environmental conditions due to their proximity to the ocean, including high levels of solar radiation, strong, constant winds and high salinity (Fig. 7).

*Tillandsia dura*, *Aechmea ramosa* var. *ramosa*, *Neoregelia ampullacea*, *Peperomia incana*, *P. corcovadensis*, *Cyrtopodium polyphyllum*, *Anthurium coriaceum*, *A. olfersianum*, *Philodendron speciosum*, *Coleocephalocereus fluminensis*, *Rhipsalis cereoides*, and *Hylocereus setaceus* are among the most frequent Angiosperm pioneer species.

There are also small clumps of plants found in deeper soils areas, including individuals of *Tibouchina corymbosa*, *Tabebuia chrysotricha*, and *Stillingia dichotoma*, in addition to the pioneer species.

Other communities are found on flat rocky surfaces in natural clearings within the forest (240–260 m altitude) on very humid soils and include *Sebastiania brasiliensis*, *Cnidoscolus urens*, *Furcraea gigantea*, *Galactia striata*, and *Stylosanthes scabra*, as well as plants considered invader species, such as *Cleome dendroides* subsp. *dendroides*, *Manihot palmata*, *Dichorisandra thysiflora*, and *Tradescantia zebrina*.

### Conservation

This area is significant because it contains a large number of species (20) endemic to the State of Rio de Janeiro, some of which are limited to the the Serra do Mar forests (Appendix 1). Among the most interesting of these are *Picramnia grandifolia* and *Philodendron speciosum*, both of which were considered practically extinct and are known from only two previous collections in Atlantic Coastal Forest areas (Pirani 1990; Mayo 1991). *Wilbrandia glaziovii* (Cucurbitaceae) had not been found growing in the wild since the 19th century




FIG. 7. Schematic profile of the herbaceous formation of the Morro Alto Mourão, Rio de Janeiro State, Brazil.

(Klein 1990). Also relevant is the finding of species that are considered either rare and/or threatened, such as *Pterogyne nitens*, *Pouteria subsessilifolia* (IUCN 2004) and *Astronium glaziovii*. The latter species has only a few collections registered in all of the Brazilian herbaria (Santin 1989). Among the plants encountered that are threatened with extinction in the municipality of Rio de Janeiro are *Inga congesta*, *Inga cordistipula*, and *Lonchocarpus virgilioides* (Lima 2000a). Additionally, *Ficus enormis* and *Coleocephalocereus fluminensis* are considered to be threatened due to destruction of their habitat in the State of Rio de Janeiro (Duarte et al. 2003; Calvente et al. 2005). Other rare species are *Gomidesia sonderiana*, which has rarely been found in the Atlantic Coastal Forest (Nic Lughadha, pers. comm.); *Alstroemeria caryophyllaea*, which had only previously been encountered growing in the wild humid and shady areas in the States of Minas Gerais and Rio de Janeiro (Assis 2004); *Pleurothallis pardipes*, recollected recently in Parque Municipal da Prainha, Rio de Janeiro State (Pinheiro 1999).

The occurrence of these rare and/or threatened species, together with numerous cases of endemism, illustrates the importance of conserving the Morro Alto Mourão area. These (and other) species could potentially be utilized as germplasm sources for seedlings production used to replant other fragments with a similar floristic compositions in the Rio de Janeiro Atlantic Coastal Forest.

It is important to note that the Morro Alto Mourão area contains a considerable number of species useful

to humans or with significant direct economic potential (see Lopes 1992), including those with medicinal (Lopes & Andreata 1989, 1990, 1991, 1992) and ornamental (Lopes et al. 2004) uses.

The economic potential of these plants, together with the proximity of the Morro Alto Mourão area to a large urban centre, complicates its preservation. Barros and Seone (1999) have proposed strategies for the conservation of areas within the Serra da Tiririca State Park including monitoring to combat plant resources extraction and fires, as well as controlling tourism.

#### CONCLUSIONS

The best represented plant families observed in the Morro Alto Mourão area followed the same patterns seen in other floristic inventories undertaken in the State of Rio de Janeiro (Marquete et al. 1992; Araujo & Vilaça 1981; Lima & Guedes-Bruni 1997; Marques 1997; PMA/JBRJ 2002).

The phyto-physiognomic analysis of this area revealed a significant vegetation cover (predominantly arboreal) in spite of both the historical and recent environmental aggression.

The eastern portion of the Guanabara Bay in the municipality of Niterói has only a few small forest fragments remaining, including the Serra da Tiririca (FEEMA 1977). This fact and the other data presented in this work reinforce the fundamental importance of preserving the biodiversity present within the Atlantic Coastal Forest in the State of Rio de Janeiro.

#### APPENDIX 1

List of the vascular plants of the Morro Alto Mourão, Rio de Janeiro State, Brazil by alphabetical order of the families, citing the specialists consulted, Latin name, habit, flowering (fl), fruiting (fr), and collector's name (\*endemic), (\*\*introduced).

#### PTERIDOPHYTES (P. Windisch & C. Mynssen)

##### Pteridaceae

*Doryopteris collina* (Raddi) J. Sm. – herb, R. Andreata 330  
*Doryopteris lomariacea* Klotzsch – herb, R. Andreata 898  
*Doryopteris patula* (Fée) Fée – herb, V. Ferreira 2107  
*Doryopteris varians* (Raddi) J. Sm. – herb, R. Andreata 34, 530

##### Schizaeaceae

*Anemia phyllitidis* Sw. – herb, R. Andreata 35, 443

##### Selaginellaceae

*Selaginella sulcata* (Desv. ex Poir.) Spring ex Mart. – herb, V. Ferreira 2106  
*Selaginella sellowii* Hieron. – herb, R. Andreata 51, 879

#### DICOTYLEDONS

##### Acanthaceae

*Aphelandra longiflora* (Lindl.) Profice – shrub, fl (Nov), fr (Nov), R. Andreata 602

*Chamaeranthemum beyrichii* Nees – herb, fl (Apr), R. Andreata 426

*Justicia beyrichii* Nees – herb, fl (May, Sep, Nov), R. Andreata 520, 523, 560, 607

*Justicia* sp. – sub-shrub, fl (Apr–May), R. Andreata 415, S. Profice 577

*Ruellia solitaria* Vell. – herb, fl (Aug), R. Andreata 92

\**Schaueria calycotricha* (Link. & Otto) Nees – shrub, fl (Jul, Oct–Dec), fr (Jul–Sep, Oct–Nov), R. Andreata 47, 91, 131, 335, 479

*Thunbergia alata* Bojer ex Sims. – climbing, fl (Nov), fr (Jul), R. Andreata 24, 453

##### Amaranthaceae

*Alternanthera* sp. – herb, fl (Jan), R. Andreata 405  
*Alternanthera brasiliiana* (L.) Kuntze var. *villosa* (Moq.) Kuntze – herb, fl (May–Jul), R. Andreata 72, 704

##### Anacardiaceae (F. Gil)

*Astronium glaziovii* Mattick – tree, fl (sterile), R. Andreata 359, 361, 716, 719

*Astronium graveolens* Jacq. – tree, fl (Jul), R. Andreata 85, 360, 369, 719, 721, 969

*Schinus terebinthifolius* Raddi – tree, R. Andreata 349

*Spondias mombin* L. – tree, fl (Sep), fr (Jan), R. Andreata 357, 504, 915

*Spondias venulosa* Mart. ex Engl. – tree, R. Andreata 915; G. Lewis 3988; D. Santin s.n.

##### Annonaceae (C.G.P. Quinet)

*Rollinia* sp. – tree, fl (Nov), R. Andreata 403, 615; C. Farney 363

##### Apocynaceae

*Aspidosperma* sp. – tree, fl (Jan), V. Ferreira 2094

*Aspidosperma parvifolium* A.DC. – tree, fl (sterile), R. Andreata 696

*Aspidosperma tomentosum* Mart. – tree, fl (Sep), fr (Sep), R. Andreata 922

*Mandevilla funiformis* (Vell.) K. Schum. – climbing, fl (Jul), fr (Jul), R. Andreata 476

*Tabernaemontana* sp. – tree, fl (Nov), R. Andreata 609

*Tabernaemontana hystrix* Steud. – tree, fl (Nov–Dec), R. Andreata 60; C. Farney 368

*Prestonia* cf. *calycina* Müll. Arg. – climbing, sterile, R. Andreata 118a

*Prestonia coalita* (Vell.) Woodson – climbing, R. Andreata 705

#### Araliaceae

*Schefflera succinea* Frodin & Fraschi – tree, fl (sterile), R. Andreata 682

#### Aristolochiaceae

*Aristolochia rumicifolia* Mart. & Zucc. – climbing, fl (Sep), R. Andreata 525

*Howardia cymbifera* (Mart. & Zucc.) Klotzsch – climbing, fl (sterile), R. Andreata 487

\**Howardia raja* (Mart. & Zucc.) Klotzsch – climbing, fl (Oct-Dec), fr (Sep), R. Andreata 37, 147, 193, 513

#### Asclepiadaceae (N. Marquete F. Silva)

*Oxypetalum banksii* Roem. & Schult. subsp. *banksii* – climbing, fl (Jul, Sep), R. Andreata 96, 544

#### Asteraceae (R. Esteves)

*Centratherum punctatum* Cass. var. *punctatum* – herb, fl (Dec), R. Andreata 19

*Cyrtocymura scorpioides* (Lam.) H. Rob. – sub-shrub, fl (Apr, Aug, Dec), R. Andreata 33, 87, 674

*Eupatorium organense* Gardner – sub-shrub, fl (Nov-Dec), R. Andreata 57, 314

*Eupatorium vitalbae* DC. – herb, fl (Aug), R. Andreata 105

*Gochnatia* sp. – tree, fl (Jan), R. Andreata 364

*Tilesia baccata* (L.) Pruski – shrub, fl (Oct), fr (Oct), R. Andreata 123, 127

#### Begoniaceae

*Begonia* sp. – herb, fl (Nov-Dec), R. Andreata 46, 194

#### Bignoniaceae

*Adenocalymma paulistarum* Bureau – climbing, fl (Jan, Dec), R. Andreata 48, 354

*Anemopaegma chamberlainii* (Sim) Bureau & K. Schum – climbing, fr (May), R. Andreata 552

*Arrabidaea aff. rego* (Vell.) DC. – tree, fl (Apr), fr (Apr), R. Andreata 669

*Cybistax antisiphilitica* (Mart.) Mart. – tree, fl (May, Nov), fr (Jan), R. Andreata 318, 347, 666

*Jacaranda jasminoides* (Thunb.) Sandwith – shrub, fl (Aug, Oct-Dec), fr (Jul, Oct-Nov), R. Andreata 55, 89, 122, 165, 301, 316, 323

*Pithecoctenium crucigerum* (L.) A.H. Gentry – climbing, fr (May), R. Andreata 163; C. Farney 740

*Sparattosperma vernicosum* Bureau & K. Schum. – tree, fl (sterile), R. Andreata 372

*Tabebuia* sp. – tree, fl (sterile), R. Andreata 988

*Tabebuia chrysotricha* (Mart. ex DC.) Standl. – tree, fl (Aug), fr (Aug), R. Andreata 104

#### Bombacaceae

*Bombacopsis glabra* (Pasq.) A. Robyns – tree, fl (Sep), fr (Jan-Feb, Apr), R. Andreata 346, 496, 665; T. Plowman 12858

*Ceiba insignis* (Kunth) P.E. Gibbs & Semir – tree, fl (Apr), R. Andreata 376, 897

*Pseudobombax grandiflorum* (Cav.) A. Robyns – tree, fl (Jul), R. Andreata 455, 713, 985

*Quararibea turbinata* (Sw.) Poir. – shrub, fr (May, Jul), R. Andreata 461, 581

#### Boraginaceae

*Cordia ochracea* DC. – shrub, fl (Nov), fr (Apr-May), R. Andreata 344, 587, 589, 610, 667

*Cordia trichotoma* (Vell.) Arrab. ex Steud. – tree, fl (Apr-May), R. Andreata 549, 663, 910, 912

\**Tournefortia salicifolia* A. DC. – sub-shrub, fl (Sep, Nov), R. Andreata 334, 546

#### Cactaceae (L. Scheinvar and A.M. Calvente)

*Brasiliopuntia brasiliensis* (Willd.) A. Berger – tree, fl (Oct), fr (Oct), R. Andreata 130

*Coleocephalocereus fluminensis* (Miq.) Backeb. – herb, fl (Apr), R. Andreata 889

*Hylocereus setaceus* (Salm-Dyck ex DC.) Ralf Bauer – epiphytic, fl (Nov), R. Andreata 304

*Rhipsalis cereoides* (Backeb. & Voll.) Backeb. – epiphytic, fl (Apr), fr (Sep), R. Andreata 326, 545, 650, 886; T. Plowman 13935

*Rhipsalis dissimilis* K. Schum. – epiphytic, V. Ferreira 2115

\**Rhipsalis mesembryanthemoides* Haw. – epiphytic, fl (Nov), R. Andreata 301; G. Martinelli 8154

*Rhipsalis neves-armondii* K. Schum. – epiphytic, fl (May), fr (May), R. Andreata 303, 592

*Rhipsalis pachyptera* Pfeiff. – epiphytic, fl (sterile), R. Andreata 302

*Rhipsalis teres* Steud. f. *capilliformis* (F.A.C. Weber) Barthlott & Taylor – epiphytic, fl (sterile), R. Andreata 327

#### Capparaceae

*Capparidastrum brasiliianum* (DC.) Hutch. – sub-shrub, fl (Nov), fr (Jul), R. Andreata 467, 611, 950

*Cleome dendroides* Schult. subsp. *dendroides* – shrub, R. Andreata 42, 106, 185

#### Celastraceae (A. Joffily)

*Maytenus brasiliensis* Mart. – shrub, fl (Apr), fr (Nov), R. Andreata 425, 973

*Maytenus communis* Reissek – shrub, fr (Aug), R. Andreata 482

#### Clusiaceae

*Clusia fluminensis* Planch. & Triana – tree, fl (Nov), R. Andreata 306

*Garcinia Gardneriana* (Planch. & Triana) Zappi – shrub, fl (Nov), R. Andreata 202

*Kilmeyera membranacea* Casar. – tree, fl (Jan–Feb), fr (Jan–Feb, Jun–Jul), R. Andreata 370, 456, 714, 725; T. Plowman 13929

#### Convolvulaceae

*Argyreia baronii* Deroin – climbing, fl (Sep), R. Andreata 538

*Ipomoea grandifolia* (Dammer) O'Donell – climbing, fl (Jan), fr (Jan), R. Andreata 367

*Jacquemontia martii* Choisy – climbing, fl (Apr, Dec), R. Andreata 411

#### Cucurbitaceae (V.L.G. Klein)

\**Wilbrandia glaziovii* Cogn. – climbing, fl (Oct), fr (Sep), R. Andreata 129, 924

**Elaeocarpaceae**

*Sloanea garckeana* K. Schum. – tree, fl (Jan), fr (Jan), R. Andreata 382

**Erythroxylaceae (T. Plowman)**

*Erythroxylum frangulifolium* A. St.-Hil. – tree, fl (Feb, Jul, Aug–Sep, Nov), fr (Feb, Jul, Sep–Nov), R. Andreata 70, 169, 501, 641; C. Farney 362; T. Plowman 12860, 13922, 13926; V. Ferreira 2239

*Erythroxylum gaudichaudii* Peyr. – shrub, fl (Jan–Feb), fr (Jan–Feb), R. Andreata 400; T. Plowman 13929, 13930

*Erythroxylum pulchrum* A. St.-Hil. – tree, fl (sterile), R. Andreata 350, 375, 970, 984

**Euphorbiaceae (L.S. Vale and A. Sousa)**

*Acalypha brasiliensis* Müll. Arg. var. *brasiliensis* – sub-shrub, fl (Aug, Dec), R. Andreata 21, 73, 919, 979

*Actinostemon communis* (Müll. Arg.) Pax var. *spathulatus* Müll. Arg. – shrub, fl (Aug), fr (Aug–Sep), R. Andreata 77, 79, 686, 689, 966, 979, 982

*Actinostemon concolor* (Spreng.) Müll. Arg. var. *obovatus* Müll. Arg. – shrub, fl (Aug, Oct–Nov), fr (Jul, Sep–Nov), R. Andreata 162, 300, 536, 618

*Cnidoscolus urens* (L.) Arthur – herb, fl (Dec), R. Andreata 43

*Croton compressus* Lam. – shrub, fl (Dec–Jan), R. Andreata 56, 378

*Croton klotzschii* (Diedr.) Müll. Arg. – sub-shrub, fl (Dec), R. Andreata 58

*Croton urticifolius* Lam. – sub-shrub, fl (Dec), R. Andreata 26

*Dalechampia alata* Müll. Arg. – climbing, fl (Dec–Jan), R. Andreata 61, 362

*Dalechampia micromeria* Bail. – climbing, fl (Nov), fr (Nov), R. Andreata 333

*Euphorbia comosa* Vell. – sub-shrub, fl (Oct, Dec), fr (Oct), R. Andreata 37, 182

*Julocroton triqueter* (Baill.) Müll. Arg. – sub-shrub, fl (Dec), fr (Jan), R. Andreata 22

*Joannesia princeps* Vell. – tree, fl (sterile), R. Andreata 992

*Manihot inflata* Müll. Arg. – shrub, fl (Jan), fr (Jan), V. Ferreira 2095

*Manihot palmata* (Vell.) Müll. Arg. – shrub, fl (Jan, Dec), R. Andreata 44, 368

*Manihot tripartita* (Spreng.) Müll. Arg. subsp. *humilis* (Müll. Arg.) Roger – shrub, fl (Nov), fr (Nov), R. Andreata 614

*Pachystroma longifolium* (Nees) I.M.Johnst. – tree, fl (Feb, Nov), fr (Feb, Aug), R. Andreata 463, 957; T. Plowman 13927

*Phyllanthus subemarginatus* Müll. Arg. – sub-shrub, fl (Sep), fr (Sep), R. Andreata 541

*Plukenetia serrata* (Vell.) L.J. Gillespie – climbing, v.v.

*Romanoa tamnoides* (A. Juss.) Radcl.-Sm. – climbing, fl (Apr), fr (Apr), Andreata 883

*Sapium glandulosum* (L.) Morong – tree, fl (sterile), R. Andreata 380

*Sebastiania brasiliensis* Spreng. – shrub, fr (Apr), R. Andreata 132, 178

*Stillingia dichotoma* Müll. Arg. – shrub, fl (Apr, Nov), fr (Apr), R. Andreata 339, 675, 885

*Tragia volubilis* L. – climbing, fl (Jan), V. Ferreira 2117

**Flacourtiaceae (R. Marquete)**

*Casearia leutzelburgii* Sleumer – tree, fr (Aug), R. Andreata 94, 722, 727

*Casearia obliqua* Spreng. – tree, fl (sterile), R. Andreata 914

*Casearia sylvestris* Sw. var. *sylvestris* – tree, fl (Aug–Sep), fr (Sep), R. Andreata 909, 925, 991; V. Ferreira 2238

**Gesneriaceae (A. Chautems and T.C.C. Lopes)**

*Codonanthe gracilis* (Mart.) Hanst. – herb, fl (Nov), R. Andreata 340

*Paliavana prasinata* (Ker Gawl.) Benth. – sub-shrub, fl (May, Jul), fr (Aug), R. Andreata 90, 584; C. Farney 736

*Sinningia aggregata* (Ker Gawl.) Wiehler – herb, fl (Sep), fr (Sep), R. Andreata 62, 542; G. Martinelli 8520

**Lauraceae (A. Quinet)**

*Aniba brittonii* Mez. – tree, fr (Apr, Jul), R. Andreata 442, 489; V. Ferreira 2121

*Ocotea aniboides* Mez – shrub, fr (Nov), R. Andreata 941

*Ocotea brachybotra* (Meisn.) Mez – tree, fr (Nov), R. Andreata 943

*Phyllostemonodaphne geminiflora* (Mez) Kosterm. – shrub, fl (Jan), R. Andreata 389, 446

**Lecythidaceae**

*Cariniana legalis* (Mart.) Kuntze – tree, fl (sterile), R. Andreata 381

**Leguminosae (Caesalpinoideae)**

*Bauhinia radiata* Vell. – climbing, fl (sterile), R. Andreata 196

*Bauhinia microstachya* (Raddi) J.F. Macbr. – climbing, fl (sterile), R. Andreata 164, 575

*Chameacrista fasciculata* (Michx.) Greene – sub-shrub, fl (Dec), R. Andreata 28, 112

*Chamaecrista glandulosa* (L.) Greene var. *brasiliensis* (L.) H.S. Irwin & Barneby – sub-shrub, fl (Nov), fr (Apr, Nov), R. Andreata 651, 670; H.C. Lima 2069

*Copaifera trappezifolia* Hayne – tree, R. Andreata 164, 576

*Pterogyne nitens* Tul. – tree, fl (Apr), fr (Apr), R. Andreata 394, 662, 911

*Senna affinis* (Benth.) H.S. Irwin & Barneby – shrub, fr (Apr), R. Andreata 410

*Senna macranthera* (DC. ex Colladon) H.S. Irwin & Barneby – tree, fl (May), fr (May), C. Farney 729

*Senna tenuifolia* (Vogel) H.S. Irwin & Barneby – shrub, fl (Apr), R. Andreata 410; H.C. Lima 3714

**Leguminosae (Papilioideae)**

*Acosmium lentiscifolium* Schott ex Spreng. – shrub, fl (sterile), R. Andreata 931; H.C. Lima 3734

*Centrosema sagittatum* (Willd.) Ridley – climbing, fl (May), fr (May), H.C. Lima 2592, 2600

*Chaetocalyx scandens* (L.) var. *pubescens* (DC.) Rudd – climbing, fl (Oct–Dec), fr (Oct, Dec), R. Andreata 36, 128, 175

*Dalbergia frutescens* (Vell.) Britt., small tree, H.C. Lima 3715

*Desmodium affine* Schlechl. – herb, fl (Apr), R. Andreata 447

*Desmodium incanum* (Sw.) DC. – herb, fl (Dec), fr (Dec), R. Andreata 25

*Galactia striata* (Jacq.) Urb. – herb, fl (Jan), fr (Jan), R. Andreata 366

*Lonchocarpus virgiliooides* (Vogel) Benth. – tree, fl (Sep), fr (Sep), R. Andreata 141, 529, 724, 726, 904, 916

*Machaerium firmum* (Vell.) Benth. – tree, fl (sterile), R. Andreata 371, 679, 681, 685

*Machaerium hirtum* (Vell.) C. Stelfeld – tree, fl (sterile), R. Andreata 893

*Machaerium oblongifolium* Vogel – climbing, fl (sterile), R. Andreata 891

*Machaerium pedicellatum* Vogel, small tree, fl (sterile), R. Andreata 892, 930

*Machaerium violaceum* Vogel – climbing, fl (sterile), R. Andreata 899; H.C. Lima 2596

*Pterocarpus rohri* Vahl – tree, fl (sterile), R. Andreata 895

*Stylosanthes scabra* Vogel – herb, fl (Oct), R. Andreata 135

*Vigna* sp. – sub-shrub, fl (May), C. Farney 733

*Zornia latifolia* Sm. – sub-shrub, fl (sterile), R. Andreata 887

**Leguminosae (Mimosoideae)**

*Acacia plumosa* Lowe – shrub, fl (Nov), fr (Feb, Apr, Nov), R. Andreata 600, 884, 964; H.C. Lima 3732

*Acacia mikanii* Benth. – shrub, fl (Nov), R. Andreata 575, 616

*Albizia polyccephala* (Benth.) Killip – tree, fl (Jan), fr (Jan, May), R. Andreata 363, 550

*Anadenanthera colubrina* (Vell.) Brenan – tree, fr (Jan), R. Andreata 348

*Inga bullata* Benth. – tree, I.A.Rodrigues s.n.

*Inga congesta* T.D. Penn. – shrub, fl (Jul–Aug), fr (Jul–Oct), H.C. Lima 2603<sup>A</sup>, 3991; R. Andreata 87, 125, 449, 451, 509

*Inga cordistipula* Mart. – tree, fl (Jan–Feb), fr (May), R. Andreata 397, 583, 639, 1003

*Mimosa arenosa* (Willd.) Poir. – sub-shrub, fl (Apr), R. Andreata 900

*Mimosa bimucronata* (DC.) Kuntze – shrub, fl (Apr), fr (Apr, Jun), R. Andreata 409, 452, 902

*Mimosa extensa* Benth. – climbing, fl (Nov), H.C. Lima 3733

*Mimosa velloziana* Mart. – shrub, fl (Apr), fr (Apr, Jul), R. Andreata 485, 660

*Piptadenia gonoacantha* (Mart.) J.F. Macbr. – tree, fl (Feb), fr (May), R. Andreata 586; H.C. Lima 3738

*Piptadenia paniculata* Benth. – tree, fl (Feb), fr (May), R. Andreata 353, 393, 547, 680; H.C. Lima 3714

*Pseudopiptadenia contorta* (DC.) G.P. Lewis & M.P.M. Lima – tree, fr (May), R. Andreata 585, 676

**Loganiaceae**

*Strychnos acuta* Progel – sub-shrub, fl (Sep), fr (Apr), R. Andreata 421, 944

*Strychnos trinervis* (Vell.) Mart. – shrub, fr (Jan), R. Andreata 383

**Loranthaceae**

*Struthanthus marginatus* (Desr.) Blume, hemi-parasite, fl (Oct), fr (Oct), R. Andreata 115, 117

**Lythraceae**

*Cuphea carthagenensis* (Jacq.) J.F. Macbr. – herb, fl (Dec), R. Andreata 39

**Malpighiaceae (W.R. Anderson and A. Amorim)**

*Amorimia rigida* (A. Juss.) W.R. Anderson – climbing, fl (Jan), fr (Jun), R. Andreata 373, 708

\*\**Bunchosia glandulifera* (Jacq.) H.B.&K. – shrub, fr (Apr), R. Andreata 664

*Bunchosia maritima* (Vell.) J.F. Macbr. – shrub, fl (Oct–Dec), fr (May), R. Andreata 41, 111, 166, 558, 890

*Heteropterys bicolor* A. Juss. – climbing, fr (Jan), V. Ferreira 2100; R. Andreata 101, 528

*Heteropterys pauciflora* (A. Juss.) A. Juss. – shrub, fl (Sep), fr (Jul), R. Andreata 488

*Heteropterys sericea* (Cav.) A. Juss. – climbing, fl (Jan), R. Andreata 390

\**Heteropterys ternstroemiifolia* A. Juss. – climbing, fr (Jul), R. Andreata 475

*Niedenzuella acutifolia* (Cav.) W.R. Anderson – shrub, climbing, fl (Aug–Dec), fr (Jan, Aug), R. Andreata 152, 155, 322, 345, 510, 636

**Malvaceae (M.G. Bovini)**

*Abutilon bedfordianum* (Hook.) A. St.-Hil. & Naudin – shrub, fr (May), R. Andreata 524, 590

*Pavonia sepium* A. St.-Hil. – sub-shrub, fl (Apr), fr (Apr), R. Andreata 431

*Sida rhombifolia* L. – sub-shrub, fl (Dec), R. Andreata 15

**Marcgraviaceae**

*Norantea brasiliensis* Choisy – shrub, fl (Nov), fr (Jan), R. Andreata 309, 401, 986

**Melastomataceae**

*Clidemia hirta* (L.) D. Don – shrub, fl (Nov), fr (Jul, Sep), R. Andreata 188, 492

*Miconia cinerascens* Miq. – shrub, fl (Apr–May, Sep, Nov), fr (May, Sep, Nov), R. Andreata 138, 184, 414, 493, 933; C. Farney 730

*Miconia staminea* (Desr.) DC. – shrub, fl (Nov), fr (Nov), R. Andreata 186

*Ossaea marginata* (Desr.) Triana – shrub, fl (Sep–Nov), R. Andreata 144, 187, 515

*Tibouchina corymbosa* (Raddi) Cogn. – shrub, fl (Nov–Jan), R. Andreata 59, 317, 377, 901

**Meliaceae**

*Guarea guidonia* (L.) Sleumer, fl (Nov), R. Andreata 189; V. Ferreira 2093

*Trichilia alternans* DC. – tree, fl (Oct–Nov), R. Andreata 143, 170

*Trichilia casarettii* DC. – tree, fr (Apr, Jul), R. Andreata 423, 450

*Trichilia elegans* A. Juss. subsp. *richardiana* Penn. – shrub, fl (Nov), fr (Jul), R. Andreata 308, 482

*Trichilia pseudostipularis* (A. Juss.) DC. – shrub, fl (Jan, Nov), fr (May), R. Andreata 402, 594

*Trichilia silvatica* DC. – shrub, fl (Nov), fr (Aug), R. Andreata 107, 935

**Menispermaceae (J.M.A. Braga)**

*Chondrodendron platyphyllum* (A. St.-Hil.) Miers – climbing, fr (Apr), R. Andreata 419

\**Hyperbaena oblongifolia* (Mart.) Chodat – climbing, fl (Jul, Sep), fr (Sep), R. Andreata 502; V. Ferreira 2235

**Moraceae (J.P.P. Caraúta)**

*Cecropia glaziovii* Snelth. – tree, fl (sterile), R. Andreata 937, 971

*Coussapoa curranii* J.M. Blake – tree, fl (Jul), R. Andreata 457  
*Dorstenia arifolia* Lam. – herb, fl (Jan, Nov), R. Andreata 183, 395, 646; V. Ferreira 2124

*Dorstenia cayapia* Vell. – herb, V. Ferreira 2102

*Dorstenia turnerifolia* Fisch. & C.A. Mey. – herb, fl (Nov), R. Andreata 438; V. Ferreira 2111

*Ficus arpazusa* Casar. – tree, fr (Nov), R. Andreata 612

*Ficus enormis* (Mart. ex Miq.) Miq. – tree, fl (May, Jul), fr (May, Jul), R. Andreata 478, 593; C. Farney 738

*Sorocea hilarii* Gaudich. – tree, fl (Apr–May), fr (May), R. Andreata 436, 555, 571; V. Ferreira 2112

#### Myrtaceae (G.M. Barroso, M.C. Souza and M. Sobral)

*Campomanesia schlechtendaliana* (O. Berg) Nied. – small tree, fl (sterile), R. Andreata 938

*Eugenia jurujubensis* Kiaersk. – shrub, fl (Oct–Nov), fr (Apr, Jul, Oct), R. Andreata 148, 149, 190, 324, 332, 340, 434, 483

*Eugenia sulcata* Spring. ex Mart. – tree, R. Andreata 960

*Eugenia uniflora* L. – tree, fr (Apr), R. Andreata 81, 495, 967, 974, 983

\**Gomidesia gestasiana* (Cambess.) Legrand – shrub, fl (Nov), fr (Jul), R. Andreata 434

*Gomidesia sonderiana* O. Berg – shrub, fl (Nov), R. Andreata 307, 617

*Marliera racemosa* (Vell.) Kiaersk. – tree, R. Andreata 473

*Myrcia insularis* Gardner – shrub, fl (Jan), R. Andreata 387, 940

*Myrcia racemosa* (O. Berg) Kiaersk. – tree, fl (sterile), R. Andreata 926

*Myrcia richardiana* (O. Berg) Kiaersk. – tree, fl (Nov), fr (Jan), R. Andreata 388

*Myrciaria floribunda* (H. West ex Willd.) O. Berg – shrub, fr (Jan), R. Andreata 606, 968, 976

*Myrciaria glazioviana* (Kiaersk.) G. Barroso ex Sobral – shrub, fr (Sep), R. Andreata 499, 506

*Psidium cattleyanum* Sabine – tree, R. Andreata 622, 962

Indet.1 – tree, fl (sterile), R. Andreata 978

#### Myrsinaceae (M.F. Freitas)

*Myrsine coriacea* (Sw.) R. Br. ex Roem. – tree, fl (sterile), R. Andreata 939

#### Nyctaginaceae (C.F.C. Sá)

*Bougainvillea spectabilis* Willd. – shrub, fl (May), R. Andreata 551

*Guapira opposita* (Vell.) Reitz – shrub, fl (Jul–Sep), fr (May, Sep), R. Andreata 75, 80, 108, 486, 540, 559, 688, 698, 700, 950, 975, 989, 990; V. Ferreira 2240

#### Ochnaceae

*Ouratea parviflora* (DC.) Baill. – shrub, fl (Sep), fr (Sep), R. Andreata 521

#### Olacaceae

*Heisteria perianthomega* (Vell.) Sleumer – tree, fl (sterile), R. Andreata 720

#### Oxalidaceae

*Oxalis barrelieri* (L.) Small. – herb, fl (Aug, Dec), R. Andreata 13, 69

*Oxalis fruticosa* Raddi var. *daphniformis* (J.C.Mikan) Lourteig – sub-shrub, fl (Feb), R. Andreata 643; T. Plowman 13928

*Oxalis sepium* A. St.-Hil. – sub-shrub, fl (Nov), R. Andreata 305

#### Passifloraceae

\**Passiflora racemosa* Brot. – climbing, fl (May, Jul–Aug, Oct–Jan), fr (May, Jul), R. Andreata 31, 121, 198, 459, 588, 921

#### Phytolacaceae

*Gallesia integrifolia* (Spreng.) Harms – tree, fl (sterile), R. Andreata 392

*Microtea paniculata* Moq. – herb, fl (Jan), V. Ferreira 2094

*Petiveria alliacea* L. – sub-shrub, fl (Aug, Dec), R. Andreata 20, 82; V. Ferreira 2096

#### Picramniaceae (J.R. Pirani)

\**Picramnia grandifolia* Engl. – shrub, fl (Jul), R. Andreata 458

#### Piperaceae (E.F. Guimarães and D.M. Ferreira)

*Peperomia corcovadensis* Gardner – epiphytic, fl (Oct), R. Andreata 157

*Peperomia incana* (Haw.) Hook. – herb, fl (Sep, Nov), fr (Feb), R. Andreata 315, 649; T. Plowman 13934; G. Martinelli 8528

*Peperomia tetraphylla* (Forst.) Hook. & Arn. – epiphytic, fl (Nov), R. Andreata 201

*Piper amalago* L. var. *medium* (Jacq.) Yuncker – shrub, fl (Dec), R. Andreata 168, 923

*Piper amplum* Kunth – shrub, fl (Feb), fr (Feb), T. Plowman 12861

#### Plumbaginaceae

*Plumbago scandens* L. – climbing, fl (Nov), R. Andreata 325

#### Polygonaceae

*Coccoloba confusa* R.A. Howard – shrub, fl (Sep), R. Andreata 531

*Ruprechtia laxiflora* (Meisn.) Kuntze – tree, R. Andreata 952

*Ruprechtia lundii* (Meisn.) Kuntze – tree, fl (Sep), R. Andreata 718

*Triplaris scandens* (Casar.) Coccucci – tree, R. Andreata 918

#### Portulacaceae

*Portulaca mucronata* Link – herb, fl (Nov), R. Andreata 338, 535

*Talinum patens* (L.) Willd. – herb, fl (Oct–Nov), fr (Oct–Nov), R. Andreata 134, 177

*Talinum racemosum* (L.) Rohrb. – herb, fl (Aug), R. Andreata 66

#### Rhamnaceae

*Reissekia smilacina* Endl. – climbing, fl (Nov), R. Andreata 341

#### Rubiaceae (M. Gomes)

*Alseis* sp. – tree, fl (sterile), R. Andreata 678

*Alseis floribunda* Schott – tree, fl (Sep), fr (Jan–Sep), R. Andreata 717

*Alseis involuta* K. Schum. – tree, fl (Sep), fr (Jan–Sep), R. Andreata 358, 505, 980, 981

*Chomelia brasiliensis* A. Rich. – shrub, fl (Feb), fr (Feb), R. Andreata 428, 640; T. Plowman 13925

*Coussarea* sp. – shrub, fl (sterile), R. Andreata 972

\**Coussarea capitata* (Benth.) Benth. & Hook. – tree, fl (Oct), R. Andreata 137

*Coutarea hexandra* (Jacq.) K. Schum. var. *fluminensis* K. Schum. – tree, fl (Apr), fr (Apr–May), R. Andreata 661, 691, 697

*Faramea stipulacea* (Cham. & Schlecht.) DC. – shrub, fl (May, Sep), fr (May–Jul), R. Andreata 469, 491, 557; C. Farney 737

\**Faramea* sp. – tree, fl (Dec), R. Andreata 54; V. Ferreira 2110

*Mitracarpus ihotzkyanus* Cham. – herb, fl (Nov), R. Andreata 176

*Posoqueria acutifolia* Mart. – shrub, fr (Jan), R. Andreata 384

*Psychotria brachyceras* Müll. Arg. – shrub, fl (Oct–Dec), R. Andreata 30, 116, 171

\**Psychotria stenocalyx* Müll. Arg. – shrub, fl (Oct–Nov), fr (Apr, Sep, Nov), R. Andreata 153, 418, 604; C. Farney 369

*Randia armata* (Sw.) DC. – shrub, fr (Apr), R. Andreata 441

*Richardia brasiliensis* Gomes – herb, fl (Jul), R. Andreata 16

*Rudgea minor* (Cham.) Standl. subsp. *calycina* (Benth.) Zappi – shrub, fr (Mar), H.C. Lima and F.C.P. Garcia 5027

*Rudgea francavillana* Müll. Arg. – shrub, fl (Sep), fr (Sep), R. Andreata 491, 507

\**Rudgea interrupta* Benth. – shrub, fl (Jan, Sep, Nov), fr (Jan, Apr–May, Jul), R. Andreata 396, 420, 471, 474, 512, 572, 951; C. Farney 61; V. Ferreira 2103

*Rudgea subcordata* Müll. Arg. – shrub, fl (Oct), fr (Apr), R. Andreata 118

*Simira sampaionia* (Standley) Steyermark. – tree, fl (Oct), R. Andreata 124, 683, 723

*Simira viridiflora* (Allemão & Saldanha) Steyermark. – tree, fr (May, Jul, Nov), R. Andreata 195, 460, 574

**Rutaceae (M. Emmerich and J.R. Pirani)**

*Almeidea rubra* A. St.-Hil. – shrub, fl (May, Jul, Nov–Dec), fr (May, Aug, Nov), R. Andreata 53, 101, 467, 596; C. Farney 370

*Conchocarpus ovatus* A. St.-Hil. – shrub, fl (Nov), C. Farney 371

\**Cusparia ovata* (A. St.-Hil.) Tul., small tree, fl (Nov–Dec), fr (Apr), R. Andreata 197, 442, 158

*Esenbeckia febrifuga* (A. St.-Hil.) A. Juss. ex Mart. – tree, fr (Jul), R. Andreata 484

*Galipea jasminiflora* (A. St.-Hil.) Engl. – shrub, fl (Apr), fr (Apr), R. Andreata 416

*Neoraputia alba* (Nees & Mart.) Emmerich – tree, fr (Apr), R. Andreata 439

**Sapindaceae (G.V. Somner)**

*Allophylus edulis* (A. St.-Hil.) Radlk. – shrub, fl (Apr), R. Andreata 444

*Allophylus heterophyllus* Radlk. – shrub, fl (Oct), fr (Apr), R. Andreata 130, 440

*Allophylus laevigatus* Radlk. – shrub, fr (Oct), R. Andreata 109

*Allophylus semidentatus* Radlk. – tree, fl (Sep, Nov), R. Andreata 603, 942

*Cupania* sp. – tree, fl (sterile), R. Andreata 934

*Cupania racemosa* Radlk. – tree, fr (Jul), R. Andreata 374, 472, 728

*Paullinia meliifolia* A. Juss. – climbing, fr (Apr–May), R. Andreata 445, 598

*Serjania corrupta* Radlk. – climbing, fr (May), R. Andreata 589

*Serjania cuspidata* Cambess. – climbing, fr (Apr), R. Andreata 703

*Serjania fuscifolia* Radlk. – climbing, fl (Apr–May), fr (Apr), R. Andreata 417, 548

*Urvillea stipitata* Radlk. f. *stipitata* – climbing, fr (Apr), R. Andreata 668

**Sapotaceae (M.H.D. Monteiro)**

*Chrysophyllum flexuosum* Mart. – tree, fl (Jan, Apr), fr (Apr), R. Andreata 424; V. Ferreira 2105

*Pouteria subsessilifolia* Cronquist – tree, fl (Aug, Oct), fr (Oct), R. Andreata 133

*Pouteria psamophila* (Mart.) Radlk. – tree, fl (Oct), R. Andreata 161

**Solanaceae (L.F.d'A. Carvalho)**

*Athenaea anonacea* Sendtn. – shrub, fl (sterile), R. Andreata 355

*Aureliana fasciculata* (Vell.) Sendtn. var. *fasciculata*, small tree, fr (Oct), R. Andreata 114

*Brunfelsia uniflora* (Pohl) D. Don – shrub, fl (Aug), R. Andreata 100

*Capsicum schottianum* Sendtn. – shrub, fl (Sep), R. Andreata 522

*Dysochroma viridiflorum* (Sims) Miers – shrub, fl (Aug–Sep), R. Andreata 103, 605

\**Metternichia principis* Mikan var. *principis*, small tree, fl (Feb, Sep), fr (Jan, Jul, Nov), R. Andreata 352, 480, 508, 638, 677; T. Plowman 13923

*Solanum alternatopinnatum* Steud. – climbing, fl (Apr), fr (Apr), R. Andreata 413

*Solanum americanum* Mill. var. *americanum* – sub-shrub, fl (Nov), fr (Nov), R. Andreata 180

*Solanum arenarium* Sendtn. – shrub, fr (Jan), R. Andreata 404

*Solanum argenteum* Dunal – shrub, fl (Aug), fr (Aug–Nov), R. Andreata 71, 179

*Solanum caavurana* Vell. – shrub, fl (Nov), R. Andreata 328, 608

*Solanum incarceratum* Ruiz & Pav. – shrub, fl (Dec), R. Andreata 40

*Solanum megalochiton* Mart. var. *megalochiton* – climbing, fr (May), R. Andreata 597

*Solanum melissarum* Bohs – shrub, fl (Sep), R. Andreata 936

*Solanum swartzianum* Roem. & Schult. var. *swartzianum* – shrub, fl (Oct), R. Andreata 133

*Solanum* sp. 1 – sub-shrub, fr (Jul), R. Andreata 490

**Theophrastaceae**

*Clavija spinosa* (Vell.) Mez – shrub, fr (Apr), R. Andreata 437

**Trigoniaceae (E.F. Guimarães)**

*Trigonia eriosperma* (Lam.) Fromm & Santos – sub-shrub, fl (Oct), fr (Aug), R. Andreata 76, 110

**Turneraceae**

\**Turnera serrata* Vell. – sub-shrub, fl (Jun, Jul, Sep), fr (Aug, Sep, Nov), R. Andreata 84, 181, 497, 511, 710

**Ulmaceae (J.P.P. Caraúta)**

*Celtis brasiliensis* (Gardner) Planch. – shrub, fl (Sep), fr (Jan, Mar, Sep), R. Andreata 516, 913; H.C. Lima and J.F.C.P. Garcia 5026

**Urticaceae**

*Urera mitis* (Vell.) Miq. – shrub, fl (Apr), R. Andreata 429

**Verbenaceae**

*Aegiphila mediterranea* Vell. – tree, fl (Aug), R. Andreata 78

*Lantana* sp. – sub-shrub, fl (Aug), fr (Sep), R. Andreata 74, 498

*Stachytarpheta cf. maximilianii* Schauer – herb, fl (Dec), R. Andreata 23

*Stachytarpheta polyura* Schauer – herb, fl (Oct), R. Andreata 146

*Vitex polygama* Cham. – shrub, fl (Sep, Nov), fr (Sep, Nov), R. Andreata 331, 543

**Violaceae**

*Rinorea laevigata* (Sol. ex Ging.) Hekking – shrub, fl (Aug, Sep), fr (Aug, Nov), R. Andreata 88, 532, 949

**MONOCOTYLEDONS****Agavaceae**

*Furcraea gigantea* Vent. – herb, fl (Feb), T. Plowman 12855

**Astromeriaceae**

*Alstroemeria caryophyllaea* Jacq. – herb, fl (May, Jul, Aug), fr (May), R. Andreata 102, 412, 414, 462, 570, 573; C. Farney 732

**Amaryllidaceae**

*Hippeastrum reginae* Herb. – herb, fl (Apr, Jul, Sep), R. Andreata 514, 946

**Araceae (S.J. Mayo and M.A.C. Nadruz)**

*Anthurium coriaceum* (Graham) G.Don – herb, fl (Sep), R. Andreata 343, 539

\**Anthurium luschnathianum* Kunth – herb, fl (Feb, Nov), S. Mayo 607; V. Ferreira 2109

*Anthurium olfersianum* Kunth – herb, (Feb, Nov), R. Andreata 206; S. Mayo 606; V. Ferreira 2119

*Anthurium pentaphyllum* (Aubl.) G.Don – epiphytic, fl (Dec), R. Andreata 310

*Anthurium scandens* (Aubl.) Engl. subsp. *scandens* – epiphytic, fl (Nov), R. Andreata 207

*Monstera adansonii* Schott var. *klotzschiana* (Schott) Madison – herb, v.v.

*Philodendron bipennifolium* Schott – herb, S. Mayo 603

*Philodendron corcovadense* Kunth – herb, v.v.

*Philodendron cordatum* Kunth – herb, v.v.

*Philodendron crassinervium* Lindl. – herb, S. Mayo 605

\**Philodendron speciosum* Schott ex Endl. – herb, S. Mayo 602

**Arecaceae**

*Attalea* sp. – tree, fl (Jan), R. Andreata 391

*Syagrus romanzoffiana* (Cham.) Glassman – tree, fl (May), fr (May), R. Andreata 553, 687, 690, 692, 693, 695, 699

**Bromeliaceae (G. Martinelli)**

*Aechmea nudicaulis* (L.) Griseb. var. *nudicaulis* – epiphytic, fl (Nov), R. Andreata 209

*Aechmea purpureo-rosea* (Hook.) Wawra – herb, v.v.

*Aechmea ramosa* Mart. ex Schult. var. *ramosa* – herb, fl (Jul), R. Andreata 465

*Aechmea sphaerocephala* Baker – herb, fl (Sep), G. Martinelli 8525

*Alcantarea glazioviana* (Lem.) Leme – herb, fl (Sep), R. Andreata 671; G. Martinelli 8527 (cultivated)

*Billbergia pyramidalis* (Sims) Lindl. var. *pyramidalis* – herb, fl (Nov–Dec), R. Andreata 65, 205

*Bromelia antiacantha* Bertol. – herb, fl (Sep), G. Martinelli 8523

*Neoregelia ampullacea* (E.Morren) L.B.Sm. – herb, fl (Jan), V. Ferreira 2114: G. Martinelli 8515

*Neoregelia sarmentosa* (Regel) L.B.Sm. – herb, fl (Nov), R. Andreata 204

*Pitcairnia staminea* Lodd. – herb, fl (Apr), R. Andreata 878

*Tillandsia araujei* Mez var. *araujei* – herb, R. Andreata 896; G. Martinelli 8521; T. Plowman 13933

*Tillandsia dura* Baker – herb, fl (Apr, Nov), R. Andreata 321; G. Martinelli 8519; T. Plowman 13924

**Cannaceae (J.M.A. Braga)**

*Canna glauca* L. – herb, fl (Nov), fr (Nov), R. Andreata 517

**Commelinaceae**

*Dichorisandra thrysiflora* J.C. Mikan – herb, fl (Apr, Nov), R. Andreata 336

\**Siderasis fuscata* (Lodd.) H.E. Moore – herb, V. Ferreira 2104

*Tradescantia zebrina* Bosse – herb, v.v.

**Cyperaceae (C.S. Muniz)**

*Bulbostylis capilaris* Clarke – herb, fl (Nov), R. Andreata 313

*Cyperus coriifolius* Boeck – herb, fl (Sep), R. Andreata 533

*Cyperus diffusus* Vahl – herb, fl (Dec), R. Andreata 18

*Trilepis eximia* (Clarke) Pfeiff. – herb, fl (Sep), R. Andreata 534

**Dioscoreaceae**

*Dioscorea* sp.1 – climbing, fl (Nov), R. Andreata 613

*Dioscorea* sp.2 – climbing, fl (Jan), fr (Jan), V. Ferreira 2120, 2122

*Dioscorea* sp.3 – climbing, fl (Nov), R. Andreata 150

*Dioscorea glomerulata* Hauman – climbing, fl (Jan), R. Andreata 406

**Heliconiaceae (J.M.A. Braga)**

*Heliconia laneana* Barreiros var. *laneana* – herb, fl (Oct), V. Ferreira 2116

**Herreriaceae (R.C. Lopes)**

*Herreria salsaparrilha* Mart. – climbing, fl (sterile), R. Andreata 730

**Iridaceae**

*Neomarica* sp. – herb, fl (Apr), R. Andreata 433

**Marantaceae (J.M.A. Braga)**

*Calathea eichleri* R.H. Petersen – herb, fl (Nov), fr (Jan), R. Andreata 680

*Calathea truncata* Lodd. – herb, fl (Nov), R. Andreata 45, 621

*Maranta foliosa* Körn. – herb, fl (Nov), fr (Apr), R. Andreata 342, 578

**Orchidaceae (L. Toscano and F.C. Pinheiro)**

*Cyclopogon bicolor* (Ker-Gawl) Schltr. – rupicolous, fl (Jul), T.B. Croat 53728; J.L. Moutinho 01

*Cyrtopodium polyphyllum* (Vell.) Pabst ex F. Barros – herb, fl (Sep), fr (Sep), R. Andreata 537

*Epidendrum denticulatum* Barb. Rodr. – herb, fl (Nov), R. Andreata 208  
*Epidendrum filicaule* Lindl. – epiphytic rupicolous, fl (Nov, Dec), R. Andreata 337; F. Pinheiro 195  
*Maxillaria marginata* (Lindl.) Fenzl – rupicolous, fl (Oct), F. Pinheiro 181  
*Octomeria alpina* Barb. Rodr. – epiphytic, fl (Sep), F. Pinheiro 173  
*Oncidium fimbriatum* Lindl. – epiphytic rupicolous, fl (Oct), F. Pinheiro 180  
*Oncidium pumilum* Lindl. – epiphytic, fl (Apr), F. Pinheiro 202  
*Pleurothallis grobyi* Lindl. – rupicolous, fl (Feb, Mar), F. Pinheiro 144; L.O.F. Souza 41  
*Pleurothallis pardipes* Rchb. f. – epiphytic, fl (Mar), F. Pinheiro & M. Guerra s/n  
*Pleurothallis saundersiana* Rchb. f. – epiphytic rupicolous, fl (Mar), F. Pinheiro 143  
*Sophronitis cernua* Lindl. – epiphytic, v.v.

#### Poaceae (A.G.Burman)

*Bambusa* sp. – herb, fl (Oct), R. Andreata 920  
*Ichnanthus* sp. – herb, fl (Oct), R. Andreata 126  
*Olyra brasiliensis* (Bertol.) Spreng. – herb, fl (Oct), R. Andreata 156  
*Pennisetum setosum* (Sw.) Rich. – herb, fl (Oct), R. Andreata 145  
*Stipa latifolia* (L.) Raspail – herb, fl (Oct–Nov), R. Andreata 319

#### Smilacaceae

*Smilax* sp. – climbing, fr (Oct), R. Andreata 140  
*Smilax quinquenervia* Vell. – climbing, sterile, R. Andreata 151, 554  
*Smilax subsessiliflora* Duham. – climbing, fl (Sep), fr (Apr), R. Andreata 95, 159, 167, 200, 435, 518, 527

#### Velloziaceae

*Vellozia candida* J.C. Mikan – herb, fl (Apr), R. Andreata 881

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